# Mosaic transformation in organisations

**Patrick Hoverstadt**

**Abstract**

This paper uses the concepts of complexity and variety to analyse the widespread failure of some common approaches to large-scale organisational change. It is based on field research of organisation-wide change programmes in which three common approaches to change are assessed, including their inherent contradictions and their weaknesses in practice. Where change was successful, it was by the accidental adoption of a more organic approach to change, after planned programmes failed. The author relates this finding to the concept of mosaic transformation in biology, goes on to develop a new approach to organisational change designed around the viable systems model and an organic approach to structuring change processes.

**Keywords**

viable systems model, organisational change, organic transformation

**Biography**

Patrick Hoverstadt is a consultant using systems methods to help clients with complex problems, particularly in the field of organisational structure and organisational change. He has worked in many sectors and from national government level to small businesses.

**Affiliation**

Visiting Lecturer at Manchester Business School

**Contact**

Fractal, 23 Birchbrook Road, Lymm, Cheshire, WA13 9SA, UK.

E-Mail: Patrick@fractal-consulting.com

## Introduction

The author was engaged on some field research into the reasons for the widely reported incidence of the failure of large-scale organisational change projects. The research included an analysis using ideas from systems theory about complexity and variety (Beer 1979 and 1985; Checkland 1981) and this revealed some fundamental weaknesses in some of the more commonly applied methodologies for managing organisational change which are largely based on the assumption that the fundamental problem to organisational change is resistance (Katz and Kahn 1978; Moorehead and Griffin 1992). The observation and analysis of both the existence and nature of the problem and, in particular, some of the common aspects of the breakdown of change programmes led to the development of a new approach to structuring change. This approach seeks to address the underlying weaknesses of conventional approaches, and is based partly on the use of Stafford Beer's viable systems model (Beer 1979 and 1985), and partly on the change process known in biology as mosaic transformation. After the theoretical development of the approach, it was tested in designing the change programme for a manufacturing firm.

## Background to the field research

The field research was a ten-month observation of six firms involved in company-wide change programmes. As well as analysing the different approaches to change undertaken by the six companies, and observing and monitoring the progress of change programmes, key meetings and developments were observed first hand. For three of the firms, this included observing critical team meetings where fundamental problems in the design of the change process were exposed, which could not be addressed by managers – these proved to be the critical stalling points in the change programmes. Unless these meetings had been observed first hand, it is highly unlikely that the true cause of the programmes' failures would have been revealed.

These firms had between 50 and 200 staff, operating in the same sector, supplying pressings, assemblies and engineered components predominantly to the automotive industry. The organisational change they all attempted was the adoption of TQM (Total Quality Management). The research aim was to find out why such attempts had a high failure rate (usually quoted as being around 80 per cent). The generally accepted reason given for the high failure rate was 'poor leadership'. A primary objective of this research was to discover whether this was an adequate or valid explanation.

It was not a research objective to discover alternative approaches, so the emergence of a theory of a better change methodology was unexpected.

**The problems of change programmes**

The findings of the research contradicted the received wisdom of the times, since it was rarely the case that programme failures could be attributed to 'poor leadership'. In almost every case, there was someone willing and able to step into and fulfil the leadership role. Certainly, leadership played a part, but it was largely overshadowed by other factors. One of these, and in every case a critical one was the nature and structure of the change programme. These varied, but they reflected a typical set of approaches to large-scale change, and all proved to have fundamental flaws. These flaws stemmed largely from the often naive and simplistic understanding that managers had of the nature of organisations and the nature of change.

The firms in the study used three discernible approaches to change programmes: 'Top Down', 'Top Down and Bottom Up' and 'Attitude Change'. The first two refer to architectures of change, whereas 'Attitude' refers more to a theoretical view of the nature of change, its drivers and resistors.

Within the context of business in the West, these three approaches are common, and represent a fairly typical approach to organisational change where this is undertaken as a deliberate programme rather than just contingent adaptation.

**'Top down' approaches**

'Top down' approaches to change derive from the hierarchical view of organisations shared by most managers in the study. The premise is that those at the top learn about the new approach, then cascade this down the hierarchy through middle managers and supervisors to the workforce. This is attractive for managers, since they have the reassurance of finding out about the proposed change before their subordinates, and the change methodology re-emphasises the hierarchy within the organisation.

In the context of introducing TQM, there was an inherent contradiction in this approach, since what was being propounded was partly a refutation of the hierarchical principle, in that the espoused changes included workers taking over ownership and control of their own processes. In practice, this contradiction between the message of empowerment and autonomy, and the hierarchical medium by which it was delivered, produced much confusion, with managers' behaviour contradicting what they were saying. In the context of this study, it is

significant that the structure of the programme effectively reinforced behaviours that managers were supposed to be modifying.

More important than this contradiction between message and medium was that this approach implicitly based on the hierarchical model suffered from all the limitations of hierarchy as a useful model of organisations. In particular, it failed to take into account the problems of establishing effective cross-functional management, creating serious difficulties at both operational and strategic levels.

At a strategic level, it invariably happened that some managers only paid lip-service to change. These managers acted as blocks to the cascade of change, and effectively either blocked, failed to communicate, or failed to implement change. As a result, the change programme, far from being comprehensive, and disseminated progressively throughout the organisation, became fragmented, and only truly effective in parts. This had inevitable repercussions at the operational level, as the theory of the 'transformed organisation' ran into the reality of the 'old way of working' at departmental boundaries. The hierarchical model offered no real solution to the boundary disputes that change inevitably creates, other than escalation, which resulted in the politicisation of the change process, this in turn led to more managers becoming resistors to change. This was a fundamental flaw of the top-down approach, which this study showed to be inherently extremely fragile. The top-down approach relied for its effectiveness on being a homogeneous and total approach, in which the whole of the organisation is transformed successively from the top down. However, in practice, single individuals in key positions often stopped or stalled an entire programme. Given the inherent diversity of managers' viewpoints within any organisation, it is almost inevitable that a top-down approach will run into this sort of problem if attempted in an organisation of any size. Advocates of the top-down approach tended to take a hierarchical view of organisations, and invariably overestimated the power that position in the hierarchy conferred. In practice, senior managers had the power to start change initiatives, and the power to block change initiatives, but did not have the power to make initiatives actually happen. The hierarchical perspective consistently underestimated the real autonomy of managers and staff, and the ability of individuals or groups to block initiatives.

A further problem with the top-down approach was the assumption of homogeneity. Precisely because these were seen as 'whole company' transformations, the effort put into the transformation process was generally not focused. In every case, there was insufficient management resource available to maintain particular initiatives within a programme, and in nearly every case, change initiatives failed, and had to be restarted as a direct result of the lack of

management support. This was a clear case of managers lacking requisite variety (Ashby 1956) to deal with 'total' change in anything other than a superficial (and therefore inadequate) way. There was a need for structural redundancy of both resources and communications to enable change. Invariably, both were lacking when change was attempted across the whole organisation. This was an endemic problem that was exacerbated by the perceived need to tackle the problem of organisational change in a homogeneous fashion from the top down. As well as the problem of managers not having requisite variety to cope with the sheer number of issues that arose, there was also the problem of using a homogeneous approach in a heterogeneous environment. Within any organisation, the diversity of viewpoints about proposed changes, and the diversity of experience of previous changes meant that some parts of the organisation were able to change much more easily than others. This led to unplanned differentials in the rate of change between departments, teams and individuals. These differentials led to friction and disputes between teams and departments at the operational level.

The finding of heterogeneous structures and cultures within the organisations is consistent with both a soft systems approach (Checkland 1981) and the findings of Meek (Meek 1992) from a social anthropology perspective. Despite these findings, organisational developmental approaches have historically underestimated the diversity of perspective within organisations. Managers in the field made no such mistakes, and were under no illusions as to the difficulty changing some parts of their organisation. There was a clear gap between the formal theory of organisational change that was available to them, and their own perception of the hard realities of the workplace. This was clearest in those firms trying to implement change in a homogeneous top-down fashion. There was a definite sense of managers starting off with the belief that this was an impossible task.

**'Top down and bottom up' approaches**

Some companies in the study were aware of the common problems of the top-down approach. In particular, they recognised that it inherently contradicted the message they were trying to put across, and that top-down approaches had a reputation for 'running out of steam'. Recognising this, some of the firms adopted a 'top down and bottom up' approach. This was widely advocated as a solution to the problems of cascading change through the organisation, and was designed to work on the principle that change would be introduced at the shop-floor level and driven by the workforce as well as management. The advantages expected of this were that there would be greater momentum to the change process (because there were more people directly involved early on), that managers who resisted change would find themselves under pressure both from their staff and their managers.

In practice however, these theoretical advantages proved elusive. Having to involve different levels, right across the organisation stretched managers even further than a simple top-down approach, so the problem of manager's lack of requisite variety was not solved in the short term. In the longer term, it was hoped that the greater level of involvement would act as a variety amplifier, but in practice this also proved disappointing. In particular, the capacity of workers to put pressure on recalcitrant managers was generally very short lived, and in fact the vast majority were far too cautious to attempt this. Shop-floor caution was a major problem in several firms, and it was repeatedly the case that managers seriously overestimated the ability and confidence of workers to assume ownership of their own processes. Several managers fell into the trap of believing their own rhetoric, and assumed that simply telling teams that they were now empowered to take certain decisions would make it so. In reality, 'teams' needed far more input and resourcing before they could actually begin to operate effectively. Many individual workers and workgroups needed constant reassurance from their managers that it was all right for them to take decisions about operational matters. This inevitably put managers under pressure both in terms of time, and more critically in terms of consistency, since it was often difficult to resist seizing control from a group that were unused to taking decisions, and therefore slow or incompetent at it. Where managers were unable to resist the temptation to intervene, the result was to reaffirm the suspicions that the empowerment being espoused was a sham, and one that workers got involved with at their peril. The cynicism created was particularly damaging to future progress, and justified the cautious approach taken by many.

As well as failing to deliver the benefits expected compared to a 'top down' approach, the 'top down and bottom up' approach also failed to deal with some of the other problems. It did not offer a solution to the problems of boundary conflicts, nor was it based on any adequate organisational model that could help to provide participants in the change process with a means of finding their own solutions.

**'Attitude change'**

In this study, both managers and consultants often said, 'What we need is a change in culture.' Trying to unpack what this meant proved very difficult. Mostly it seemed to imply that what was needed was for staff to think and act differently. This formed the rationale for an approach to change management that focused on individuals' attitudes as the major element that would create or prevent change. This was manifest in the attempts made to push through change using 'hearts and minds' campaigns.

All of the change programmes in the research used some form of 'hearts and minds' campaign to try to change the attitudes and awareness of staff. However, at its most

extreme, there was one attempt to introduce change that was (initially at least) based exclusively on this approach. In focusing exclusively on individuals' attitudes, this approach totally ignored the demands and restraints put upon these individuals from the system, so from a systems point of view, it was not surprising that this attempt failed. Managers put the workforce through a training programme on TQM principles and practices, and then expected them to go back to work and introduce these on their own initiative. The management were surprised that nothing changed as a result of this, and genuinely had difficulty recognising that behaviours had not changed because the system had not changed. This was an extreme example, but in nearly all cases there was an overemphasis on individuals' attitudes as the prime mover of change, and a lack of appreciation of their systemic context. From a systems perspective, culture may be seen as an emergent property of the system, and as such, the preoccupation with 'changing the culture' is simply to confuse a symptom or phenomenon – culture – with its cause. From this point of view, it is not surprising that attempts to change attitudes without also changing the organisational system in which these attitudes had emerged were largely ineffective, either because the exhortations to think or behave differently were immediately dismissed as unrealistic in the context of a particular firm, or because they quickly became discredited when they came into conflict with the system that reinforced the old culture. Attitudinal change-based programmes quickly switched from being idealistic and evangelical to cynical and secretive, with 'believers' unwilling even to publicly air their views. These findings were in line with those of Beer, Eisenstat and Spector (Beer et al. 1990)

> Most change programmes don't work because they are guided by a theory of change that is fundamentally flawed. The common belief is that the place to begin is with the knowledge and attitudes of individuals. Change in attitudes, the theory goes, lead to changes in individual behaviour. And changes in individual behaviour, repeated by many people, will result in organizational change. According to this model, change is like a conversion experience. Once people 'get religion', changes in their behaviour will surely follow.
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> This theory gets the change process exactly backward. In fact, individual behavior is powerfully shaped by the organisational roles that people play. The most effective way to change behavior, therefore, is to put people into a new organizational context, which imposes new roles, responsibilities, and relationships on them. This creates a situation that in a sense, 'forces' new attitudes and behaviors on people
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> [Beer, M., Eisenstat, R.A. and Spector, B. 1990, *Harvard Business Review*]

Whilst the findings of this research were broadly in agreement with this view, the fact that programmes that relied principally on changing attitudes failed, does not mean that attitudinal change was misguided or unnecessary. Clearly, it was essential in creating a platform for sharing understanding at all levels about the changes being introduced, their purpose and value. What the failure shows is that attempts at attitudinal change were inadequate on their own, and needed to be combined with changes to processes and structures.

**The inadequacy of mental models**

In every case, the process of organisational change was considerably hampered by the inadequacy of the mental models used by managers. The two most common formal models in use were the hierarchical model, and the 'internal customer-supplier model'. That both these proved inadequate in providing a language in which it was possible to discuss the practical problems that confronted managers, was a serious disadvantage. As well as effectively dictating the structure of change programmes, the hierarchical model failed to provide any mechanism for resolving the boundary disputes that change brought about, and actually exacerbated these. Disputes were inevitably escalated through management levels, creating conflict between managers, and genuine consternation amongst managers unsure of how such issues should be dealt with. The 'customer-supplier model' advocated by many TQM proponents simply broke down, either because it could not be reconciled with the dominant hierarchical model, or because it could not adequately address problems of multiple customers with conflicting requirements. Some managers rejected the customer-supplier model, either because the process flows proved too complex to unravel, or because they recognised that as a process model rather than an organisational model, it was inadequate.

The inadequacy of available organisational models produced some bizarre behaviour. Confronted with evidence of interdepartmental quality problems, and on being asked in formal meetings how these should be addressed within the new way of working, managers in three firms were simply unable to answer, and ignored the question. Even when the question was restated, it was literally ignored. Managers refused even to engage with a question to which they knew they had no organisational answers.

Both the 'top down' and 'top down and bottom up' approaches suffered from the problem of engaging with major systemic change without the benefit of an adequate systemic model to inform that change. This showed up most clearly in the problem of boundary disputes, and managers' inability to cope with these adequately. This is a fundamental problem in systemic change, since simultaneous

change of the total system, effectively redesigning the organisation from scratch, requires a more sophisticated model and greater resources than were available, and partial change inevitably creates problems at subsystem boundaries. This is a critical issue. Unless these problems are dealt with, they become the friction within the organisation that stops the change process. In these three cases cited, failure to deal with these issues caused almost instant failure of that part of the programme. These boundary problems were not merely operational issues, but inevitably became political as well. Although the companies in the study encountered these problems in implementing TQM programmes, exactly the same generic issues occur in other types of change programme, and account for the finding (Arthur D. Little) that 68 per cent of Business Process Re-engineering (BPR) programmes throw up unforeseen problems, particularly at system or process boundaries. These are problems that are generic in any major change.

**The breakdown of programmes**

All the programmes in the study broke down in that the planned change programme failed. In all cases, there were elements of the organisation that did not change. However, in most cases some parts of the organisation did change. These tended to be those parts that were most susceptible to change. The greater adaptability of these units stemmed from more cohesive structures, more interested managers, or more educated or committed workers. Gaps quickly developed between teams and departments that were engaging with change and those that were not. These gaps fragmented change programmes. Invariably at this stage of programme failure, managers responsible for change switched their efforts away from those areas where they were failing into the areas where they were enjoying relative success. As well as being a pragmatic response to a difficult situation, and a sensible use of their inadequate resources, this was also a very human response. Faced with a task with a high failure rate, and given the option between nurturing those parts of the programme which showed some hope and those which were stubbornly resisting change, it is entirely natural to support the successes rather than confront the failures. The effect of this focus on the easy targets was to amplify the differentials that were emerging, thereby further fragmenting the homogeneous nature of the programme.

In effect, change programmes that were intended to be homogeneous and ‘whole company’ programmes broke down into discrete patches of change. This concentrated the impetus and resources for change coming from management on to just a few individuals or teams. Homogeneous undifferentiated change became in practice, heterogeneous, highly differentiated and discrete change.

Given the diversity of viewpoints, the variation in the willingness to accept change, and differences within workgroups in the support for change and capacity for learning, this fragmentation seems entirely natural. Furthermore, the response of managers to this situation of fragmentation was also both natural and pragmatic. The key issue is, therefore, would it have been more effective, more certain of success and less costly to have planned to undertake change in this way from the outset and, if so, how could this have been done? Certainly the failure of change programmes was inefficient, costly, and wasteful. Scarce resources were used up in futile attempts to change recalcitrant parts of organisations that required a far greater investment of time and effort if they were to stand any realistic prospect of success. When change was attempted and failed, this prejudiced the prospects for any future change attempt – having seen change espoused, but not put into effect, staff became cynical about change in general and managers' pronouncements in particular. If the objective was wholesale organisational change, then not attempting to change part of the organisation at the outset was preferable to attempting change and failing – second attempts were always more difficult. The human cost involved in programme failures was that these increased the cynicism of staff, undermined the credibility of managers, and increased conflict between workgroups and their managers. Apart from the wastefulness and costs of programme failures, the real inefficiency was in failing to carry out whole company change.

Could change programmes have been planned better? With the benefit of hindsight, it was clear that the intended homogeneous change was unrealistic and inherently fragile, and that the attempts at change that emerged from programme breakdowns were more realistic and practicable. What these attempts still lacked was robustness. Because they concentrated scarce management resources available for creating and maintaining momentum for change, piecemeal initiatives had a much greater chance of success, but they still suffered from interdepartmental problems where two modes of operation came into conflict at boundaries. To resolve this problem, what managers needed was an organisational model that would help them to predict such problems, and plan how these might be handled.

In summary, the accidental adoption of the partial solution of piecemeal change that emerged from programme failures had the advantages of going some way towards matching the level of initiatives to the available level of resources, selecting easy targets first, and building on success. What this ad hoc approach still lacked was any potential planning mechanism for selecting or prioritising targets, any mechanism for predicting or dealing with boundary conflicts, or any mechanism for planning a logical succession of initiatives.

**Mosaic transformation**

Taking the ad hoc response of change managers as a starting point, it is possible to construct a methodology for widespread organisational change that addresses the key problems of the ad hoc approach using a more sophisticated organisational modelling tool, combined with a conceptual model of change dynamics borrowed from evolutionary biology. The organisational modelling tool is Beer's viable systems model or VSM (Beer 1979), and the evolutionary concept is that of mosaic evolution, or mosaic transformation.

**Mosaic transformation in biology**

Mosaic is the term used to describe a process in evolutionary biology by which organisms evolve, and in particular, how individual elements can transform their function within a biological system. Evolutionary biology was forced to face early on the problem of the impracticality of total change. Cuvier (1812) argued that evolution was impossible because if one part of an organism changed, this would imply simultaneously changing all other connecting parts in a cascade of simultaneous change that would be so complex it would be unimaginable. Subsequent study of the fossil record showed however that structural components were able to change in a relatively discretefashion, provided that there was a degree of structural redundancy within the system. As an example of this process, the 'hammer', 'anvil' and 'stirrup' bones that provide the mechanism for transmitting and amplifying sound in the ears of mammals evolved from bones originally used as part of the jaw (and still used for that purpose in reptiles and birds). This is a major change of the purpose and use of structural elements, but was only possible because of the existence within the original jaw of a degree of structural redundancy, i.e. other body parts that could fulfil the function that these bones originally fulfilled.

**An 'organic' approach**

The ad hoc approach to organisational change that came to be adopted by change managers within this study was 'organic' in that it emerged from the natural dynamics of the changing system, but was nevertheless extremely problematic. The development of mosaic transformation as a methodology for organisational change represents an attempt at what could be termed 'planned organic change', in that the natural dynamics of a potential change situation are consciously recognised, harnessed and managed.

Key issues to be addressed in developing the methodology are the need to be able to:

- Model the total system
- Recognise and categorise subsystems within the total system

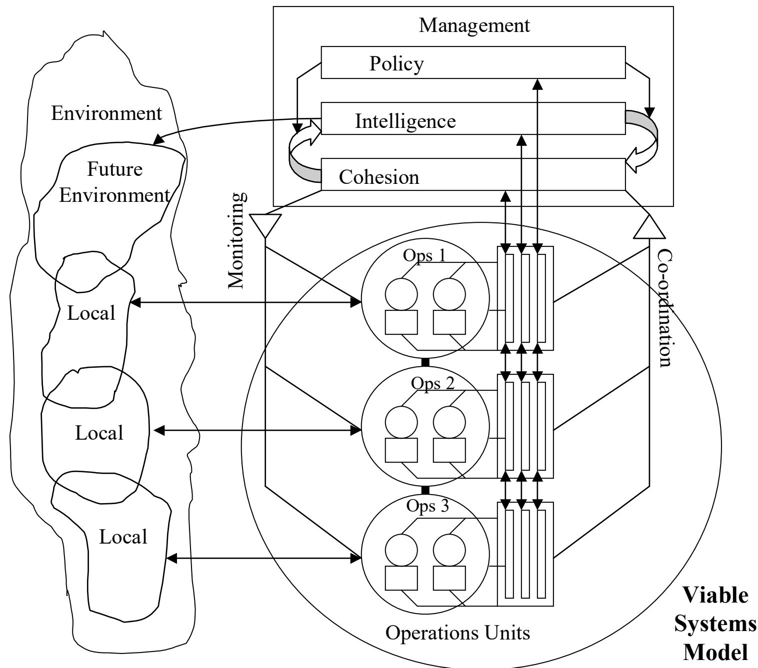
- Evaluate subsystems’ capacity for change
- Prioritise the change sequence
- Create structural redundancy
- Create a dynamic for incremental change
- Match available management capacity to the scope of change being undertaken
- Manage the boundary problems created by change

The plurality, and diversity of organisations is implicitly recognised and replicated within the structure of a mosaic approach, so one failing of the homogeneous, total organisation approaches is intrinsically dealt with.

**Organisational application**

As applied to organisations, mosaic transformation involves introducing change in a sequence of planned initiatives that allow managers to concentrate on changing elements of the organisation in a fairly discrete way, whilst managing the interfaces between that element and the rest of the organisation so that change is not prevented by resistance through boundary issues. The sequence of change needs to be planned so that each stage helps prepare for subsequent changes either by creating structural redundancy (often in the form of management time released from firefighting) or by removing structural obstacles to subsequent changes.

Applying the concept of mosaic to organisational change relies on having a robust and relevant model of organisations as systems. Most organisational models only deal with specific issues e.g. power structures or ownership. To manage "mosaic" change requires a more sophisticated and systemic model of organisational relationships to allow detailed investigation of the effects on the rest of the organisation of changing one part. Beer’s VSM is such a model and provides an ideal platform for intervention. In theory, simple process models might be thought adequate to anticipate change effects on adjacent elements, but in practice, as the experience of Business Process Re-engineering shows, this is not the case, and no process model can adequately set out the systemic context of change. Within the mosaic process, the VSM provides a view of the organisation as a system, and the relationships of organisational elements within that system. This allows us to anticipate the effects changing one element will have on the rest of the system. This ability is crucial in predicting and managing boundary problems. In addition, the classification of processes and the definition of their relationship to organisational elements within VSM helps in assessing the potential systemic benefits of particular changes.




Following a systemic overview, the next stage is deciding where to start change. This can involve several factors. The general rule is that change must be practicable and worthwhile. Assessing practicability should include evaluating the relative capacity for change of the units concerned. The factors that affect this include:

- Group cohesion
- Experience of and attitude to change
- Skill at changing
- Quality of leadership
- Number and severity of probable boundary problems
- Management resources available to assist change

Assessment of which changes are most worthwhile at any point in the process must take into account both the intrinsic value of the change – i.e. how far it takes the organisation towards the intended destination – and critically, the capacity of the change to create structural redundancy or other factors to aid subsequent stages of mosaic transformation The factors that aid further development will include removal of structural or process obstacles to subsequent change.

Weighing up these various factors presents quite a complex decision. In many cases, there will be an option between an initiative that is more easily achievable, but less desirable, and one that is more difficult, but will yield bigger dividends. Although, in many cases this will be a matter of judgement, there are some hard rules that will need to be obeyed. First, the proposed change must be matched by the resources available. Although Mosaic inherently reduces the probability of management

overstretch, it doesn’t eliminate it, and in some organisations, management resources available to effect change are so stretched that only the smallest systemic changes are practical. Second, there is often in major systemic change a natural chain of progress, almost a critical path within the plan of change, such that ‘A’ has to be changed before ‘B’ becomes practicable. This interdependency of issues or problems is a systemic feature, and is one reason for the need for a systemic overview of the organisation. Once these two basic rules have been applied, the major consideration is the creation of structural redundancy, since this can be used to create the momentum for further change.

Once change is being undertaken, boundary problems can become as big an issue as the change itself. As well as a functional analysis to identify where these are likely to occur, consideration also needs to be given to non-functional relations, and in particular the political dimension of the context needs to be considered. By making change incremental and planned, a mosaic approach helps to concentrate change management resources, so that these can be more tightly focused on the interfaces of the change area to manage boundary disputes.

**Example of mosaic transformation in planning a change programme**

The example described was in GRS, one of the companies involved in the field research. The problems GRS faced were fairly typical of companies within the research group. Their competitive environment was changing fast, and dramatically, in terms of technology, customer demands, competitive pressures and market turbulence. The demands managers faced were a need to improve quality, productivity, manufacturing response time, tendering and product-development response times. The only way GRS could address their strategic problems was through a programme of major organisational change starting with a commitment to a whole-organisation TQM project. This programme suffered many of the problems referred to earlier. In response, the mosaic approach was designed as an alternative approach to creating change.

The first stage was an organisational analysis using the VSM as an investigative platform, to which was later added a number of subsidiary analytical tools as needed. The initial VSM analysis provided an explanation of the systemic linkages between several persistent organisational and operational failures in the company. In particular, there was a clear link between the operating structure of the main press shop, its inability to cope with increasing numbers of small batches on short lead times, the incapacity of the production control department to force orders through this press shop to schedule, and the firefighting undertaken by managers to try to get this department to deliver.

Using the mosaic approach, the starting point suggested was the light press shop. Here, the human factors were fairly balanced: on the one hand, the press-shop team lacked cohesion, and were unused to group work, or problem solving; on the other hand, most of the staff had the motivation of resenting the frequent disruptions as jobs were started and then stopped, and recognised the need to do things differently. On the positive side there were two issues, structural redundancy, and boundary issues. A huge proportion of management time was engaged in trying to make light pressings work, and this represented an enormous resource that would be released if light pressings could be transformed – here was the potential structural redundancy that could create the capacity for cascading further change. Boundary issues – normally a problem of change – were here a problem of the existing situation. The failures of light pressing meant that welding had to struggle with incorrect quantities and faulty pressings that did not fit together properly. The only problem with starting with the press shop was the scale of the task, and the lack of management resources available to carry this through. The solution to this came in the nature of the change being implemented, which was to restructure the light pressing and welding into manufacturing cells each capable of handling a subset of the company's 2000 product lines. This meant that rather than having to transform the whole of the press shop at one go, cells could be constructed sequentially, by taking a few presses and press operators, and a few welders and putting them together as a cell team. This was the reapplication of the mosaic principle at the level of the shop rather than at the level of the whole company. The VSM also provided a design tool for managing the potential problems around boundaries, in particular resolving the issues of management relations both in transition and in the redesigned state, and identifying issues of work flow and scheduling.

The management resources locked into managing light pressings were, in relation to the size of the company, enormous. Light pressing was the great bottleneck, and a maze for production planning. In an attempt to solve its production planning problems, the company had repeatedly recruited more staff into production planning to the point where it had approximately six times as many staff engaged in this as equivalent firms in their sector. The move to cells massively reduced the complexity of decision-making needed for production planning, changing it from a very complex and unstable process to one that was almost trivial. This therefore provided an opportunity for rationalising production planning as the next stage in the mosaic transformation of the company. In terms of the mosaic approach, the first stage had effectively removed a major obstacle to carrying out the second stage of change.

This second major stage of the mosaic process was to streamline order processing from receipt of customer order through to start of production, and was effectively a small BPR project, using existing IT more effectively. A process that had involved sixteen interdepartmental information transfers between six departments was reduced to three transfers between two departments. This redesign also involved the amalgamation of the production control function and the commercial function. The production control changed from a process that needed to take a series of interconnected decisions about which operations were to be carried out on which presses, run by which operators and in which order, to a process in which they merely needed to decide which cells were to do which jobs. Had this second stage been approached in a traditional way, it is easy to envisage a BPR consultant advocating carrying out a BPR project to streamline order processing, but without previously restructuring the press shop. In this scenario, re-engineering order processing would have been much more difficult, dangerous, and would have left the main bottleneck in place. Using the mosaic approach, the critical obstacles to second and third phase change are anticipated when deciding on first phase change, and changes can be sequenced to remove obstacles for successive stages. With the simplification of order processing, the possibility existed to redeploy experienced and skilled staff previously engaged in production control. In terms of mosaic, this was the freeing-up of structural redundancy that could be used for a whole series of transformation initiatives.

This was a third phase of change. The most strategically significant of these were changes to tendering. Tendering demands came in clusters, as customers geared up for a model change. It was strategically very important to become locked into the customers' supplier base by winning a critical mass of the tenders within any model, since minor suppliers were always more vulnerable to deselection. A single director carried out tendering, so it was often unable to deal with surges in demand. The release of the very experienced staff from production control (most of whom had worked successfully as production supervisors) allowed the creation of a flexible engineering resource that could be used to cope with these surges in demand when needed, and at other times could be deployed on to a series of smaller change initiatives to do with process and quality improvements throughout the firm.

This project illustrates the main elements of the mosaic transformation approach, and is in sharp contrast to the traditional approaches to change as experienced in the research programme. Mosaic transformation allowed a heterogeneous organisation to tackle change in a heterogeneous fashion with initiatives suited to their context. It allowed managers to plan their change programme in an incremental way, which matched initiatives to resources. It allowed critical obstacles to change to be removed successively, and for structural redundancy to be created

to provide the momentum for change. It allowed boundary issues around initiatives to be anticipated and managed.

**Conclusion**

In the context of large-scale organisational change projects, the conventional approaches to structuring change programmes are known to be weak and prone to failure. Detailed observation of these failures analysed from a systems and cybernetics perspective show that the conventional approaches are conceptually and practically flawed. Mosaic transformation offers an alternative approach that is systemic, coherent and practicable, allowing change resources to be deployed more efficiently, and creating a dynamic for change in which discrete changes prepare the way for successive changes.

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